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DISTRIBUTIONAL AND FOOD PLANT RECORDS IN THE CYANIPENNIS SUBGROUP OF THE GENUS *LYTTA*

(Coleoptera: Meloidae)

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The *Cyanipennis* Subgroup of the genus *Lytta* Fabricius is composed of three morphologically similar species of blister beetles found in western North America. The most widely distributed of these, *Lytta nuttalli* Say, occurs in sympatry with the others, *L. cyanipennis* (LeConte) and *L. viridana* LeConte, which are apparently allopatric in distribution. Each of these species has been found feeding in the adult stage on a variety of legumes, but at the time of Selander's (1960) study of the genus *Lytta*, only *L. cyanipennis* had been recorded from the genus *Lupinus*.

In the course of a field investigation of *Plebejus (Icaricia) icarioides* (Boisduval), a lycaenid butterfly closely associated with *Lupinus*, Downey has had the opportunity of observing adults of all species of the *Cyanipennis* Subgroup feeding on flowers and seed pods of *Lupinus* at several localities in the western United States. Records of these observations are reported in this paper, together with a few records from other sources.

LYTTA NUTTALLI Say

A series of 15 specimens was collected 12 miles south of Jacob Lake, 8800 feet, Coconino County, Arizona, July 2, 1961, on *Lupinus barbiger* Watson. The beetles were feeding in great numbers.

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Concerning the distribution of *Lytta nuttalli*, attention should be called to a record (as *Cantharis nuttalli*) from Fort Dodge, Iowa, published by Wickham (1911). This is the only record of the species from Iowa; it was overlooked by Selander (1960).

LYTTA CYANIPENNIS (LeConte)

Four new records of this species were obtained by Downey, as follows: Red Canyon, 7475 feet, near Hebgen Reservoir, Gallatin County, Montana, July 5, 1960, on *Lupinus sericeus* Pursh (6 specimens); Galena Summit, 8500 feet, Blaine County, Idaho, July 1, 1960, on *Lupinus arbustus calcaratus* (Kellogg) Dunn (42 specimens); 20 miles north of Vernal, 8200 feet, Uintah County, Utah, June 18, 1960, on *Lupinus caudatus* Kellogg (3 specimens); 2 miles south of Snake River Entrance to Yellowstone National Park, 6750 feet, Teton County, Wyoming, July 5, 1960, on *Lupinus argenteus* Pursh (3 specimens). In addition, we have a record of 14 specimens collected by Dr. G. F. Edmunds, Jr., at Mountain Dell, near the summit of Big Mountain (summit at 8263 feet), Salt Lake County, Utah, on *Lathyrus* sp.

From a distributional viewpoint, the record from north of Vernal, Utah, is of interest because it extends the known range of the species eastward into the Uintah Mountains, within a few miles of the eastern border of the state. The specimens from the Uintah Mountains are like those from the Wasatch Mountains of Utah described by Selander (1960) with regard to the form of the hind trochanters. As expected, the specimens from Idaho and Montana exhibit the typical spined (male) or distinctly angulate (female) condition of the hind trochanters, while those from Wyoming show an intermediate development of this character.

The undetermined species of *Lupinus* recorded by Selander (1960) as a food plant of *Lytta cyanipennis* in the Wasatch Mountains of Utah (Alta and Brighton) has now been identified as *Lupinus spathulatus* Rydberg. This plant is a close relative of *L. argenteus*, which is recorded above as a food source of this same species of beetle in Wyoming. At the Wyoming locality *Lupinus sericeus* (the food plant in Montana) occurred with *L. argenteus*, but specimens of *Lytta cyanipennis* were found only on the latter species. Since so few specimens are involved, no conclusion regarding food plant preference is warranted. The possibility of such a preference is an interesting one, however, and deserves investigation.

LYTTA VIRIDANA LeConte

Three new records of this species are available. The first is based on eight specimens collected 9 miles west of Encampment, 8700 feet, Carbon County, Wyoming, July 9, 1960, on *Lupinus alpestris* A. Nelson. This record, the third for the species in Wyoming, severely narrows the distributional gap between *Lytta viridana* and *L. cyanipennis*. The latter species has been recorded from Carbon County, Wyoming, at Como and Saratoga³. The new locality for *L. viridana* is in the Sierra Madre Mountains at a point about 20 miles south-southwest of Saratoga. Since both Como and Saratoga are at elevations considerably lower than the locality in the Sierra Madre Mountains, it is conceivable that the two species are at least partially isolated by altitudinal differences. It should be pointed out, however, that we really do not know precisely where and at what elevations the specimens of *L. cyanipennis* labeled as from Como and Saratoga were taken. As intimated below, it is unlikely that *L. viridana* and *L. cyanipennis* are isolated by food plant differences, especially in view of the fact that the food plant of *L. viridana* in the Sierra Madre Mountains is very closely related to *Lupinus argenteus*, a known food plant of *Lytta cyanipennis*.

The second new record of *L. viridana* is from Caribou, 8800 feet, Boulder County, Colorado, June 16, 1960. At this locality 8 specimens were collected from an unidentified species of the *Lupinus argenteus* complex.

The third record was obtained for us by Dr. William R. Horsfall, who found adults of *Lytta viridana* in a wet mountain meadow 6 miles west of Estes Park, 8500 feet, Larimer County, Colorado, July 5, 1961, feeding on the flowers of *Iris missouriensis* Nuttall. Radford (1959) previously recorded *L. viridana* from this species of plant in Arizona. These are the only records of this blister beetles from Iridaceae known to us.

DISCUSSION

Distributional and ecological data available on the blister beetles of the Cyanipennis Subgroup of *Lytta* suggest several problems of evolutionary significance. Adults of the three species are active at the same time of the year. Their habitats, if not

³ Wyoming localities were omitted from the list of records of *L. cyanipennis* published by Selander (1960), although the localities were indicated on the distributional map. These localities are as follows: Wyoming: Como, 1; Granite Creek and Jenny Lake, Grand Teton National Park, May, July, August, 5; Saratoga, June, 5; Yellowstone National Park, 34 (20 in July).

identical, are at least broadly overlapping. At present there is no record of actual sympatry between *L. cyanipennis* and *L. viridana*, but distributional data presented in this paper indicate that the populations are in contact. Finally, as discussed below, the beetles do not show the degree of specificity to food plants that would suggest either a means of significant reduction of interspecific competition or a basis for interspecific isolation.

At present there is nothing in what we know of the ecological relationships of *Lytta cyanipennis* and *L. viridana* to explain why these species are allopatric with each other while at the same time *Lytta nuttalli* is broadly sympatric with both of them. The answer to this problem is possibly to be found in the larval ecology. Perhaps *L. cyanipennis* and *L. viridana* have mutually exclusive ranges because of a competitive relationship involving the same larval hosts, while *L. nuttalli* has a broader range of larval hosts or a different set of hosts and is therefore able to coexist with the other species despite the possibility of some competition for adult food.

All three species of blister beetles utilize food plants of several genera. Both *Lytta nuttalli* and *L. cyanipennis* are known to feed on *Vicia* and cultivated beans; both *L. nuttalli* and *L. viridana* are recorded from *Cnemidophacos pectinatus* (Hooker) Rydberg, *Diholcos bisulcatus* (Hooker) Rydberg, and species of *Caragana*; and it is probable that both *L. cyanipennis* and *L. viridana* feed on *Lathyrus*⁴. In addition, each of the species is recorded in this paper from *Lupinus*. Within the genus *Lupinus*, no species has been recorded as a food plant of more than one species of *Lytta*, but it has been determined that members of a species complex of *Lupinus* may be utilized by more than one species of beetle. Thus, both *Lytta nuttalli* and *L. cyanipennis* are recorded from the *Lupinus sericeus* complex (involving *L. sericeus* and *L. barbiger*) and both *Lytta cyanipennis* and *L. viridana* are recorded from the *Lupinus argenteus* complex (involving *L. argenteus*, *L. spathulatus*, and *L. alpestris*). Each of these complexes consists of closely related forms, the exact taxonomic status of which is questionable; some of them now given specific names may prove to be conspecific. At any rate, in view of the relatively wide range of food plants utilized by the individual species of the Cyanipennis Subgroup of *Lytta*, it seems unlikely that closely related forms of

⁴ *Lytta viridana* has been recorded from "peavine," which is probably a reference to a species of *Lathyrus*. The occurrence of *L. cyanipennis* on *Lathyrus* is confirmed in the present paper.

Lupinus are differentiated sufficiently so as to provide a basis for interspecific isolation among the beetles feeding upon them.

With regard to interspecific isolating mechanisms operative within the Cyanipennis Subgroup, the finding of hybrids between *L. nuttalli* and *L. viridana* in Canada (Selander, 1960) suggests that genetic incompatibility may not be a critical factor. Unfortunately we do not know if these hybrids are fertile or how they compare adaptively with their parents. On the other hand, interspecific morphological differences between adult beetles involve almost without exception modifications of structural parts (antennae, legs, abdominal sterna) known to function importantly in the courtship and mating activities of one of the species (*Lytta cyanipennis*) and many other blister beetles. Thus we are led to believe that the species of the subgroup may be isolated by behavioral differences.

ADDENDUM

New records obtained after the present paper was submitted for publication demonstrate that *Lupinus sericeus*, recorded above as a food plant of *Lytta cyanipennis*, is also utilized by the other two species of the Cyanipennis Subgroup. In South Dakota (4 miles north of Moon, 6950 feet, Pennington County), on June 27, 1962, Downey collected 6 specimens of *Lytta nuttalli* and 18 of *L. viridana* on *Lupinus sericeus* var. *egglestonianus* C. P. Smith. Two days later, in Wyoming (1 mile north of Sundance, 5075 feet, Crook County), he took 25 specimens of *Lytta nuttalli* from this same variety of *Lupinus*. The record of *Lytta viridana* is the first from the state of South Dakota.

An additional record of interest was obtained for us by Mr. Hugh B. Leech, who on August 15, 1962, collected 4 specimens of *Lytta nuttalli* on a ridge above Red Lake, 11,200 feet, Virginia Lakes, Mono County, California. The beetles were feeding on *Lep-todactylon pungens* (Torrey) Nuttall, a species of Polemoniaceae.

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NOTES ON THE LEAF-CUTTER BEE MEGACHILE
(EUTRICHARAEA) GRATIOSA GERSTAECKER

(Hymenoptera: Megachilidae)

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Four species of small solitary bees have occupied artificial nest sites at Port Elizabeth. The leaf-cutter, *Megachile (Eutricharaea) gratiosa* Gerstaecker and the megachilid *Heriades freygessneri* Schletterer, have been the most numerous inhabitants. The latter species is the subject of another paper now in press.

The artificial nests have been described elsewhere, and it is sufficient to mention here that *M. gratiosa* readily used glass vials or tubes of two sizes, three inches by three-tenths of an inch and one inch by one-fifth of an inch respectively. It was found, however, that nests in glass vials tended to become mouldy through the "sweating" of the leaf fragments used in nest construction. Although some bees were successfully reared in them, many died in the developmental stages. The fact that the larger tubes were open at both ends did not seem to help. Paper cylinders of the same dimensions were substituted for the larger vials and these have been most successful. Unfortunately, however, it was impossible to observe progress in the paper cylinders. Rearing tubes made of cellophane and liberally punctured with pin holes were an improvement in this respect, but the cellophane was found to be somewhat flimsy. Cylinders made of celluloid are now being used with fair success. In a recent paper Stephen (1961) describes how milk straws were used for the mass production of *Megachile (Eutricharaea) rotundata* (Fabricius) in the Pacific Northwest, and it is intended to experiment here with the transparent type of straw if and when available.